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## GEOMETRY.

When this issue was made up no solutions of 444, 446, 449 had been received. Please give attention to these.

**451. Proposed by CLIFFORD N. MILLS, South Dakota State College.**

Determine the sides of an isosceles triangle of given area, having given that the sum of its sides is equal to the sum of its base and altitude.

## CALCULUS.

When this issue was made up no solutions of 348, 353, 354, 360, 363 had been received.

**372. Proposed by V. M. SPUNAR, Chicago, Ill.**

Find the condition that the equation:

$$\frac{d^2y}{dx^2} + \frac{1}{x} \frac{dy}{dx} - \left(1 + \frac{a^2}{x^2}\right)y = 0$$

should have one solution expressible in integral powers of  $x$ ; and show that when this condition is satisfied, every other solution of the equation possesses a logarithmic infinity at the origin.

**373. Proposed by C. N. SCHMALL, New York City, N. Y.**

In the *Encyclopaedia Britannica* article on "Capillary Action" (Vol. 5, p. 268, 11th ed.) it is shown that  $1/R_1 + 1/R_2 = p/T$ , in the case of a soap bubble, where  $R_1$ ,  $R_2$  are the radii of curvature of a meridian section and a normal section, respectively, of the bubble;  $p$ , the difference of air-pressure;  $T$ , the energy per unit area of the film. Employing the principle that the soap bubble tends to assume a form such that the area of its surface is a *minimum* for a *given volume* of air, show by the Calculus of Variations that  $1/R_1 + 1/R_2 = k$ , where  $k$  is a constant.

## MECHANICS.

Solutions of 286, 287, 288, 290, 291, 298, 299, 300 are desired.

**300. Proposed by V. M. SPUNAR, Chicago, Ill.**

A helical spring is composed of 20 turns of steel wire .258" in diameter, the diameter of the coil being 3". If the spring is compressed by a force of 50 lb., what is the maximum stress in the spring, its axial compression, and its resilience?

## SOLUTIONS OF PROBLEMS.

## ALGEBRA.

**410. Proposed by C. N. SCHMALL, New York City.**

Solve the simultaneous equations,

$$\begin{aligned}x^2 + xy + y^2 &= a, \\x^4 + x^2y^2 + y^4 &= b.\end{aligned}$$

SOLUTION BY HORACE OLSON, Chicago, Ill.

The equations may be written

$$x^2 + xy + y^2 = a, \tag{1}$$

$$(x^2 + xy + y^2)(x^2 - xy + y^2) = b. \tag{2}$$

Whence

$$x^2 - xy + y^2 = b/a. \tag{3}$$